

REMARKS

Claims 14, 17 and 21 have been amended to overcome the Examiner's rejections under 35 USC 112, first and second paragraphs. Basis for these amendments can be found in the specification. Applicant does not agree with the Examiner's rejection of claims 14-17, 20-22 and 25 under 35 USC 112, first paragraph as set forth in paragraph 6 of the previous office action. It is Applicant's position that consistency of the mixture such that it can be transferred to a sheet is an inherent characteristic of the mixture upon the disclosure in the specification that this mixture is transferred onto a sheet. The pearls can be transferred to a plain sheet by means of any known technique. One particular technique, screen printing, is even specified in a sub-claim. In any event, claim 14 has been specifically amended to recited that the mixture has a consistency which enables it to be transferred onto a sheet. No new matter has been added.

Arguments

Claims 14-17, 20-22 and 25 are rejected under 35 USC 103(a) as being unpatentable over Mori ('496) in view of JP ('153) and Jonnes ('719). It is the Examiner's position that Mori teaches the basic claimed process including a method of manufacturing a retro-reflective sheet that can be used during molding operations and

forming a retro-reflective sheet including glass lens, a transparent anchor layer and a plane sheet of transparent plastic. The Examiner acknowledges that Mori fails to teach a forming a shell having a curved or irregular surface with the capability of reflecting in all directions, the step of mixing, the step of transferring and the step of subjecting the sheet to vacuum forming. The Examiner then relies upon the teachings of JP ('153) as teaching transferring a mixture of glass beads and resin onto a substrate. The Examiner further relies upon Jonnes as teaching subjecting a retro-reflecting sheet to vacuum forming to shape the sheet into a shape corresponding to a curved or irregular surface. It is the Examiner's opinion that since these references are from analogous arts then it would have been obvious to combine the particular steps of each of the references to arrive at the present invention. Applicant disagrees with the Examiner's position for the following reasons.

Mori discloses a sealed lens type retro-reflective sheet, which, when molded, enables a resin with the retro-reflective sheet mounted thereon to be stretched to a desired form without undesirable deterioration in its optical properties. The retro-reflective sheet comprises a metallic reflective layer, a single layer of microspheres, and a transparent resin layer between them.

The sheet obtained according to Mori can be used as such on uneven surfaces such as traffic sign, or labels, stickers, emblems

or the like for vehicles or decorative purposes. This point away from the present invention.

This reference concerns the problem of stretching when co-molding, the metallic reflective layer being subjected to forces which cause cracking in this layer. Thus, this document is focused on the elongation of the retro-reflective sheet at a temperature of 90°C, corresponding to co-molding temperatures. When stretched, the thickness of the resin layer as well as the position of the microspherical lens layer relative to the metallic reflective layer remains unchanged, thus enabling the focal point to remain unchanged in many portions.

In the present application, a mixture of pearls in an adhesive transparent substance is transferred to a plain sheet. The sheet with its adjacent layer of pearls is then directly subjected to vacuum forming to a curved or irregular shape, corresponding to, for example, a helmet. As known within the art, vacuum forming is a plastic-sheet forming in which the sheet is clamped to a stationary frame and is first heated (>400°C) for more than ten seconds and is subsequently drawn down into a mold by vacuum, the substrate being heated to more than 110°C and subsequently cooled down to 20°C. It is surprising that in the inventive method, a half-melted sheet with its reflecting layer of pearls can be stretched and formed to a desired shape with more than 800% stretching without crackles in the reflecting layer, without

not claimed

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

disintegrating the reflecting layer from the adjacent sheet, and without loosing the reflecting properties.

It is evident that under such conditions, a retro-reflective sheet according to Mori, which comprises a metallic layer, can not be contemplated. The maximum elongation obtained was 41.2 percent.

Accordingly, the method of the present application allows for a rational production of retro-reflecting shells having a curved or irregular surface, which is less labor-intensive, less costly, and which results in products of higher quality. Further layers are also applied more easily.

The other two documents applied in the rejection both refer to materials that are adhered to an already formed product. In Jonnes ('719), this is most clearly shown in the figure on the front page (also, note the claims). Likewise, expressions such as "formed onto the surface of a resin molded form" (emphasis mine) in JP ('153) indicated that a reflecting layer is allowed to adhere to an already formed and shaped supportive part.

Mori fails to mention anything about the final product. The other applied references fail to indicate that the product could be a retro-reflective shell. Furthermore, none of these documents mentions or even suggests at which state a manufacturing process should be interrupted in order to arrive at the method according to the present invention. Nor does any of these documents mention or suggest the steps of a method, which are necessary for

manufacturing by means of vacuum forming a retro-reflective shell having a curved or irregular surface with the capability of reflecting light in all directions.

In conclusion, it should not be considered obvious for one having ordinary skill in the art when reading Mori to think of thermoforming by means of vacuum forming a substrate that has the retro-reflective particles already adhered to a surface in order to arrive at a method falling within the scope of claim 14 as now defined.

For the reasons set forth above, it is respectfully requested that the rejection of claims 14-17, 20-22 and 25 under 35 USC 103(a) as being unpatentable over Mori ('496) in view of JP ('153) and Jonnes ('719) be withdrawn as the combination set forth by the Examiner fails to render these claims obvious.

Conclusion

In view of the foregoing arguments and amendments, Applicant believes that the application meets all applicable statutory and regulatory requirements. Accordingly, Applicant respectfully requests allowance of all claims remaining in the application. If the Examiner has any questions regarding this amendment and/or believes that a telephone interview would assist in the advancement of this case to allowance, he/she is invited to contact the undersigned Agent for Applicant.

Respectfully submitted,

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